2

DOE's Accident Investigation Program

A primary mission of DOE is to operate its programs and facilities with a high level of safety. The accident investigation process has been designed to meet DOE safety objectives by responding to accidents in a highly coordinated, timely, and focused manner.

Specifically, the objectives of DOE's accident investigation program are to:

- Contribute to improved environmental protection and enhanced safety and health to DOE employees, contractors, and the public
- Prevent the recurrence of accidents
- Reduce accident fatality rates and promote a downward trend in the number and severity of accidents.

To accomplish these objectives, the accident investigation process must respond with speed, accuracy, focus, and brevity. The results of accident investigations can help managers eliminate underlying causes, prevent similar accidents, and enhance safety across the DOE complex. However, to achieve maximum benefit, accident investigations need to be convened rapidly, staffed and supported adequately, focused on pertinent and essential facts and causation, conducted accurately and thoroughly, concluded quickly, and reported clearly and concisely. Analytical techniques used to draw conclusions and to establish causes must be valid, appropriate, and easy to use. Finally, sound judgments of need promote better safety practices, address systemic problems, and when implemented, help prevent future occurrences.

2.1 Overall Management of the Program

The DOE Accident Investigation Program Manager (referred to throughout the workbook as the "Program Manager") in the Office of Security Evaluations, Office of Oversight, administers the program on behalf of the Assistant Secretary for Environment, Safety and Health (EH-1). The Program Manager is the central focal point for field and program office points of contact for program administration and training coordination.

2.2 Roles and Responsibilities of Key Participants

2.2.1 Appointing Officials and Line Management Participants

A number of groups and individuals play important roles in DOE's accident investigation program. These individuals and groups and their primary responsibilities are listed in Table 2-1.

Table 2-1. Appointing officials and line management participants in accident investigations have clearly defined responsibilities.

Participants	Major Responsibilities
Appointing Official	■ Appoints the accident investigation board within three days of the accident ■ Establishes the scope of the board's authority, including the review of management systems, policy, and line management oversight processes as possible root causes ■ Briefs board members before they begin the investigation ■ Closes the site investigative phase by accepting the investigation report and the board's findings ■ Closes the investigation after the closeout actions in DOE Order 225.1 are completed
Heads of Field Elements	■ Maintain a cadre of qualified[1] accident investigation board chairpersons and accident investigators ■ Ensure that DOE and contractor organizations are prepared to effectively accomplish initial investigative actions and assist accident investigation boards ■ Develop and implement corrective action plans to address judgments of need identified by accident investigation boards
Field and Program Office Points of Contact	■ Maintain a state of readiness to conduct investigations throughout the field element, their operational facilities, and the site readiness teams ■ Ensure that site DOE and contractor staff are trained to conduct or support investigations and use appropriate equipment ■ Procure appropriate equipment to support investigations ■ Maintain a current list of DOE and contractor staff trained in conducting or supporting investigations ■ Oversee the activities of the site readiness team by: — Taking initial witness statements in writing as soon as possible after an accident — Preserving the accident scene until it is examined and released by the board — Creating a photographic and videotape record of the accident scene as soon as possible after the accident occurs — Identifying, collecting, inventorying, and protecting pertinent physical evidence until it is turned over to the board — Establishing and maintaining a chain of custody for photographs, videotapes, and physical and documentary evidence until it is turned over to the board — Providing a briefing for the board on the day of their arrival at the accident site. This briefing should include, as a minimum, a description of the accident, emergency response actions taken, the status of evidence and the accident scene, and the DOE and contractor organizations having line management and oversight responsibilities related to the accident. — Determining the medical condition and fitness for duty status of accident victims and others who are directly involved in the accident as soon as possible after the accident, including requesting an autopsy, if appropriate — Making sure that all documentation pertinent to the accident, including medical records, in the possession of contractors and subcontractors is available to the board immediately upon the board's arrival at the site and as directed by the board chairperson thereafter

[1] Federal employees serving as board chairpersons or members may be required to participate in the Department's Technical Qualification Program (see DOE Order 360.1,*Training*) and may be subject to the development of office/facility-specific qualification standards.

Table 2-1. (Continued)

Participants	Major Responsibilities
Field and Program Office Points of Contact *(continued)*	■ Assist response teams in coordinating investigation activities with accident mitigation ■ Communicate and transfer information on accidents to the head of the field element, cognizant secretarial officer, or Headquarters element to whom they report ■ Communicate and transfer information to the accident investigation board chairperson before and after his/her arrival on site ■ Coordinate corrective action planning and followup with the head of the field element and coordinate comment resolution by reviewing parties ■ Assist heads of field elements in tracking implementation of corrective action plans ■ Facilitate distribution of lessons learned identified from accident investigations ■ Serve as liaison to the Program Manager on accident investigation matters

2.2.2 The Accident Investigation Board

When an accident occurs, the board must be rapidly assembled to collect the facts, conduct the investigation, reach conclusions, and prepare a report. The board's overall responsibilities are listed in Table 2-2. Responsibilities for those individuals who comprise the investigation board are described below.

Table 2-2. The accident investigation board has these major responsibilities.

Participants	Major Responsibilities
Accident Investigation Board	■ Conduct a comprehensive investigation within the defined scope, collect all pertinent information, and determine the facts relevant to the accident ■ Analyze facts and determine causal factors that contribute to the accident, with particular emphasis on determining root causes ■ Identify judgments of need that must be addressed to prevent recurrence of the accident ■ Report the essential facts and results of the investigation in a concise and understandable manner ■ Maintain appropriate communications with interested organizations throughout the investigation ■ Ensure the quality and accuracy of its activities ■ Assist the appointing official in closing the investigation, if requested

2.2.2.1. Board Chairperson

The board chairperson manages the investigation by coordinating the efforts of the board members, advisors/consultants, and support staff. The board chairperson is responsible to the appointing official for all aspects of the investigation. The chairperson maintains control of the accident scene until it is no longer needed for the investigation. The chairperson does not normally conduct investigative activities, but rather directs the overall effort, keeping it focused and on schedule. If unlawful activity is revealed during the investigation, the chairperson notifies DOE and appropriate Federal, state, or local authorities (e.g., Federal Bureau of Investigation), or in the case of fraud, waste, or abuse, the DOE Office of the Inspector General.

The chairperson's specific roles and responsibilities include:

- Taking control of the investigation from the site readiness team

- Providing leadership to the board and making decisions affecting board operations
- Establishing and communicating the roles and responsibilities of board members, advisors, consultants, and support staff
- Building effective team relationships with and among board members
- Planning, scheduling, and coordinating activities
- Establishing and meeting deadlines
- Remaining continuously informed of the investigation's progress and status
- Serving as the point of contact with the media, appointing official, and DOE management at the site, facility, or area where the accident occurred, and representing DOE in all matters pertaining to the investigation
- Coordinating with and communicating board activities to interested managers and organizations who are stakeholders with a legitimate interest in the accident
- Conducting an effective investigation that thoroughly examines all potential causal factors, including management systems
- Generating a quality report of the investigation.

2.2.2.2 Board Members

Board members are primarily responsible for collecting and analyzing information, reaching conclusions regarding causal factors, identifying judgments of need, and writing the report. Board members apply investigative and analytical techniques to make these determinations.

2.2.2.3 Advisors and Consultants

Advisors and consultants are used at the discretion of the chairperson whenever the circumstances of an accident require specialized expertise or special knowledge of the accident itself is required. These individuals may include:

- ***Legal advisor***—helpful in dealing with legal issues that may arise, including liability issues and concerns related to the Freedom of Information and Privacy Acts. DOE counsel from the operations or field office having cognizance over the site, area, or facility involved generally fulfills this role. If this is not feasible, an attorney from the Office of General Counsel can assist the board.
- ***Medical advisor***—a key person in any investigation involving an injury, illness, or death. The board may obtain advice from a physician to clarify medical issues early in the investigation.
- ***Technical experts***—provide valuable expertise during investigations involving technical information about operations, policy, hazards, failure modes, component testing, and systems.
- ***Professional/technical photographer***—critical for providing an accurate photographic record of evidence and the accident scene, using techniques not commonly known to investigators.
- ***Site personnel***—may contribute specific knowledge of processes or activities in areas such as metallurgy, chemistry, electrical operations, or conduct of operations.
- ***Union advisor***—can provide information on work practices, facilitate interviews with union members, and convey to workers the board's desire to assure that the accident is thoroughly investigated.

2.2.2.4 Support Staff Roles

The investigation board uses support staff to handle administrative functions or to provide expertise not available from members, consultants, and advisors. The following support positions are recommended:

- ***Administrative coordinator***. This individual should be familiar with the administrative and logistical needs and processes of an accident investigation and be able to provide daily coordination of these matters. Other functions include tracking and controlling documentation, securing additional resources, tracking appointments, assigning administrative tasks and priorities, and coordinating report production (a detailed list of responsibilities is included in Appendix C).

- ***Technical writer/editor***. This person can facilitate the report writing process. While board members have primary writing responsibilities, use of a dedicated writer focuses responsibility for assembling the report, facilitates report preparation, and results in a more cohesive and readable report.

- ***Typist/text processor***. A board usually needs at least one typist to perform general secretarial and administrative tasks, such as filing, word processing, and answering telephones. These personnel can often be provided by the facility where the investigation is being conducted.

- ***Court reporters***. Using a court reporting service increases the timeliness and accuracy of interview transcripts. The use of court reporters gives all members of the board the opportunity to review interviews in which they did not participate and provides a transcript for reconstructing or developing the chronology of events preceding the accident. When an investigation requires numerous interviews, use of court reporters is essential and can help prevent the investigation from getting behind schedule in its early stages, when most of the interviewing takes place and when the information from interviews is needed. This service is available commercially in most areas.

2.3 Site Readiness

DOE Order 225.1 and its Attachment 1, *Contractor Requirements Document,* establish requirements and responsibilities for heads of field elements and contractors to:

- Support Type A and Type B accident investigations

- Establish and maintain readiness to respond to accidents.

Site readiness is an important, ongoing part of DOE's accident investigation program. This section addresses responsibilities of points of contact and heads of field elements, as well as activities needed to implement those responsibilities, in meeting site readiness requirements.

2.3.1 Readiness — What Is It?

Readiness to conduct accident investigations means preparing in advance for an initial response to accidents in order to:

- Respond to accidents

- Assist in preserving, collecting, and controlling the accident scene and various types of evidence—physical, human (given through witness statements or interviews), and documentary (including photographic media)

- Mitigate the consequences of an accident

- Assist in conducting investigations.

In order to implement these requirements, the point of contact and designated readiness teams normally:

- Assist in assessing accident severity by using the accident categorization algorithm in Attachment 2 to DOE Order 225.1 and Table 1 of the *Implementation Guide for Use with DOE Order 225.1*; assist in reporting and categorizing events (in accordance with DOE Order 225.1 and DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information)*
- Assist in restoring operations, if requested
- Document the accident scene through photography or other means
- Provide facilities, equipment, supplies, tools, and general administrative and logistical support for accident investigations
- Conduct initial investigative activities
- Provide sufficient DOE accident investigation board chairpersons and investigators for Type A and Type B investigations and, if requested, provide them to other DOE sites
- Transfer the accident scene and evidence to the board chairperson when he/she arrives at the site.

Readiness teams consist of individuals who respond to accidents at the site. The team's composition, location, equipment, and other characteristics are determined by field elements and their contractors. Readiness teams coordinate their actions with or are integrated with emergency management personnel, and the performance and equipment for the team should be documented in procedures and periodically tested.

A well trained readiness team that participates in the initial response to an accident can provide valuable assistance to the accident investigation board when it assembles on site. DOE and contractor managers should ensure that accident responders and readiness teams can complete the immediate and near-term steps that will facilitate the investigation. When an accident occurs, immediate actions include taking charge of the accident scene quickly, initiating any required emergency response, assisting injured parties, ameliorating the accident conditions, restoring operations if there is no danger to workers or the public, and preserving and protecting evidence and the accident scene for later investigation. Each field element is responsible for maintaining a readiness capability to respond to accidents in this manner. To ensure the capability for the necessary rapid response, heads of field elements and designated points of contact should ensure that sufficient numbers of initial responders and prospective accident investigation board personnel are trained and available, adequate procedures for initial response have been established, equipment is available and functional, and the necessary infrastructure can be quickly assembled to respond to the accident and support the accident investigation.

Managers, through points of contact, evaluate the need for site- or organization-specific training to ensure that sufficient numbers of staff are available to perform the functions indicated. When determining the number and qualifications of potential accident investigation board members, consideration should be given to the need for supporting other Departmental elements by providing chairpersons and board members. Contracts that address accident readiness by contractors should be modified to include these provisions under DOE Order 225.1, if they are not adequately addressed in existing contracts. The benefits of incorporating initial investigative or investigative support actions into emergency preparedness plans and drills should also be considered.

An important element in establishing site readiness is to ensure that both the DOE field element and contractors work together to ensure that the site has a well coordinated and effective capability for responding to accidents. This capability includes:

- Clearly documented and coordinated procedures, roles, responsibilities, authorities, and accountabilities
- Adequate resources to support investigations
- Focused training for the field or program office point of contact and the site readiness team
- Periodic practice and evaluation.

2.3.2 Establishing Written Procedures and Responsibilities

DOE field elements should have clearly documented and integrated procedures, roles, responsibilities, authorities, and accountabilities in their implementation directives for establishing and maintaining site readiness. In addition, their contractors establish and document their own procedures to identify their organizations' operations in response to an accident or incident. Both field and organization-specific site readiness programs should:

- Contain appropriate detail regarding the specific responsibilities and activities that make up the accident response approach
- Provide clearly formulated and adequately communicated guidelines that address decisions involving trade-offs between accident mitigation/restoration of operations and accident scene/evidence preservation
- Be consistent with DOE orders
- Be coordinated with the emergency response program
- Be adequately communicated to the people responsible for taking or directing action in response to accidents.

Site readiness procedures should cover the activities indicated in Section 2.3.1.

2.3.3 Maintaining Resources to Support Accident Investigations

Sufficient resources to support an onsite accident investigation should be in place or readily available.

Ideally, readiness teams should include individuals currently involved in the emergency response function. The specific composition of the site readiness team is determined by the field elements and their contractors. Field elements are responsible for assuring that DOE and contractor organizations have mechanisms in place to provide enough qualified personnel to serve as accident investigation board chairpersons and members to support DOE accident investigations at other sites.

They also assure that other resources are readily accessible. These resources include reference documents, site references, office equipment, tools, measurement devices, office supplies, and protective gear. The *Accident Investigation Equipment Checklist* (provided at the end of this section) is a tool that field elements can use to assure adequate resources to support accident investigations are readily available at the site.

TIP

To determine the necessary number of trained site readiness personnel, consider both the site's readiness needs and the site's obligation to supply accident investigators and accident investigation chairpersons to other DOE sites.

2.3.4 Training for Site Readiness

Site readiness also requires conducting formal training for the points of contact and site readiness team members. Training for emergency response teams should ensure that when responding to an accident, they consider the need to preserve the accident scene and

evidence. Line managers and supervisors also need instruction in accident response; if present at an accident scene, these persons can be very useful in providing background about the event (e.g., people involved, witnesses present, equipment involved, material involved, and environmental factors).

The field element is responsible for identifying the minimum site- and organization-specific training requirements to support the site readiness capability. Managers within affected organizations then develop appropriate training based on these requirements and site-specific needs.

Field elements or program offices are responsible for coordinating with the Program Manager to assure that the DOE and contractor staff are trained in accident investigation techniques and readiness. In particular, the field or program office point of contact verifies that site readiness personnel responding immediately following an accident have been trained in:

- Initial reporting and categorization events (in accordance with DOE Order 225.1 and DOE Order 232.1)
- Photographing and videotaping the accident scene
- Identifying, collecting, controlling, and preserving evidence and information
- Performing other initial investigative functions, such as taking witness statements and determining the fitness-for-duty status of all accident victims
- Transferring responsibility for the accident scene, evidence, and documentation to the accident investigation board.

In addition to needing to know how, when, where, and to whom to report an accident and how to summon emergency help, those responding to an accident must know what actions they can take, and what actions require skilled and qualified emergency response professionals. Emergency personnel who direct and coordinate emergency response and rescue operations need to know what equipment, materials, and protective gear are required; how and where they are obtained; and what training or qualifications are required for their use. They also need to know the risks, hazards, or peculiarities of the operation, process, or facility, as well as what specialized knowledge, skills, procedures, and equipment are needed to safely handle them. They must know what means are needed and available to control and limit injuries and losses and to prevent emergency teams, rescuers, and investigative readiness teams from causing additional injury or loss or becoming casualties themselves.

Site readiness personnel who are prospective accident investigation board members and chairpersons, as well as the field or program office point of contact, should attend accident investigation training or demonstrate that they have the appropriate qualifications through experience in comparable investigations.

2.3.5 Conducting Practice and Evaluations

To be effective, site readiness plans and procedures should be evaluated periodically. Because of the need for coordinated efforts, the benefits of incorporating the site readiness actions into emergency preparedness plans/ procedures, as well as combining drills for site readiness and emergency preparedness, should be considered. Readiness teams can be evaluated during drills by having appropriate team members demonstrate tasks and functions such as:

- Collecting and storing evidence
- Identifying witnesses and taking statements
- Preparing an information transition plan for a board chairperson.

2.4 Accident Investigation Process Overview

The major activities between the accident and the end of the accident investigation are shown in Figure 2-1. They are discussed in detail in Part II of this workbook.

A four-week timeline has been established by DOE as a target for completing accident investigations. The schedule of activities for this timeline is shown in Table 2-3, but it is flexible and depends on specific accident circumstances, severity, and complexity. Each accident investigation cycle is determined by the appointing official, as directed in the memorandum appointing the accident investigation board. Figure 2-2 demonstrates how the three primary activity phases of an accident investigation overlap during the accident investigation cycle.

Table 2-3. The timeline for an accident investigation requires conducting multiple simultaneous tasks.

Timeframe	Activities
Week 1	Collecting evidence, conducting interviews, conducting tests (engineering, chemical, nondestructive, etc.), initiating analysis, and beginning development of the report.
Week 2	Further collection of data, more in-depth analysis, and report writing by the board.
Week 3	Additional interviews, data analysis, and report writing. Additional data collection as needed to fill gaps identified in analyses. Factual accuracy check by site DOE and contractor line management. At end of the week, the board briefs site DOE and contractor line management on facts, conclusions, and judgments of need.
Week 4	Report completion, editing, and formatting; report review by Office of Oversight; report submittal to the appointing official.

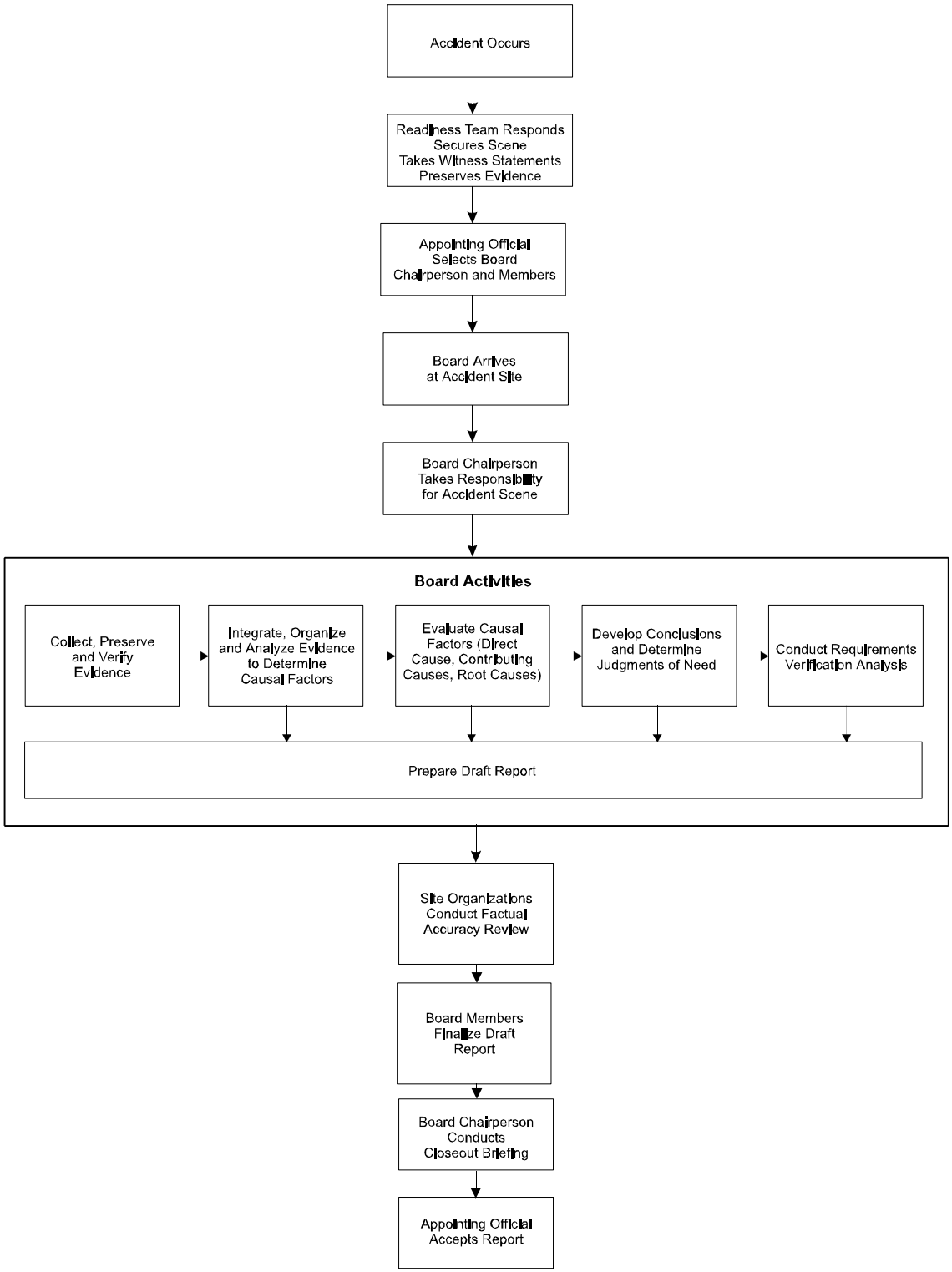

Figure 2-1. The process used to conduct an accident investigation involves many activities.

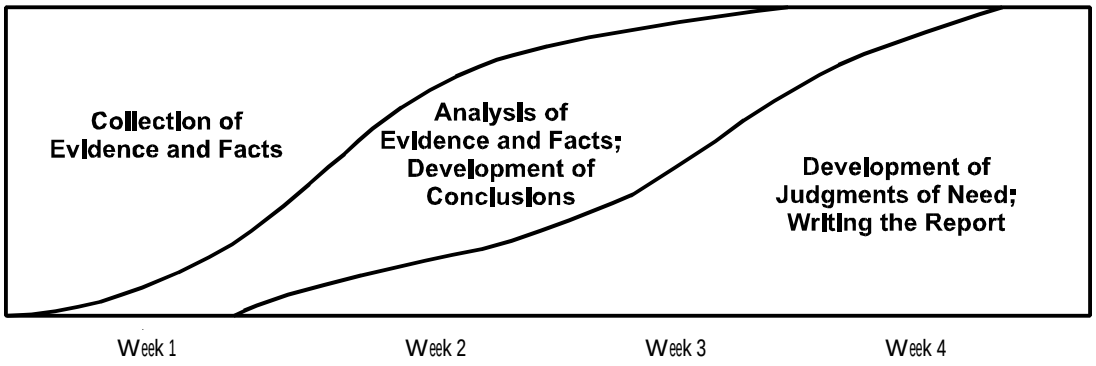

Figure 2-2. The three primary activity phases in an accident investigation overlap significantly.

KEY POINTS TO REMEMBER

The objectives of DOE's accident investigation program are to provide timely, useful, and needed information regarding the causal factors of accidents in order to prevent future accidents from similar causes.

The Office of Security Evaluations administers the accident investigation program through the Program Manager in that office. The Program Manager coordinates accident investigation training.

Each person involved in the accident investigation process plays a specific role:

- The ***appointing official*** establishes the board's authority; selects the board chairperson and board members; briefs the board before they begin their investigation activities; accepts the report; and closes the investigation.
- ***Heads of field elements*** ensure that DOE and contractor organizations in the field maintain investigative site readiness; and develop and implement corrective action plans.
- ***Field or program office points of contact*** ensure that sites can effectively respond to, conduct, or assist with accident investigations; serve as a liaison to the Program Manager on accident investigation matters; and assist in distributing lessons learned.
- ***Board chairpersons*** have overall responsibility for the investigation and are accountable to the appointing official.
- ***Board members*** perform accident investigation activities—gather information, analyze data, and report findings.

The field or program office point of contact is responsible for ensuring that the site can support accident investigation activities. To prepare for these activities, points of contact should:

- Assure that site readiness personnel are trained to respond to accidents, preserve and collect evidence, and take witness statements
- Periodically verify readiness preparedness by conducting drills to practice readiness skills.

The accident investigation cycle has a four-week timeline for completion. However, individual investigation schedules may vary, depending on an accident's complexity.

Accident Investigation Equipment Checklist

(✓)	Checklist	Notes
	DOCUMENT PACKET	
	DOE Order 225.1 Accident Investigations	
	Implementation Guide for Use with DOE Order 225.1	
	Witness Statement Form	
	Change Analysis Form	
	Barrier/Control Analysis Form	
	SITE DOCUMENTS	
	Organization charts	
	Facility maps	
	Applicable blueprints and as-built drawings	
	Policies and procedures manuals	
	ES&H manuals	
	Training manuals	
	Phone books (local, facility, and HQ)	

Accident Investigation Equipment Checklist

(✓)	Checklist	Notes
	OFFICE SUPPLIES	
	18 In/Out baskets	
	Adhesive notes (assorted sizes & colors)	
	Adhesive flags (assorted colors)	
	Chart paper (1/4" grid)	
	12 hard-bound journals	
	2 boxes suspension folders	
	12 letter-size expandable files	
	3 boxes computer disks	
	1 box full-page dividers	
	8 calendars	
	3 boxes pens - each red/black	
	4 heavy black markers	
	1 box yellow highlighters	
	1 box pencils (hard)	
	12 boxes paper clips	
	12 boxes binder clips (assorted)	
	1 box rubber bands (assorted)	
	1 heavy-duty stapler	
	1 box heavy-duty staples	
	1 heavy-duty staple remover	
	4 boxes staples	
	8 desk staplers	
	8 staple removers	
	8 tape dispensers/tape	

Accident Investigation Equipment Checklist

(✓)	Checklist	Notes
	OFFICE SUPPLIES (cont'd)	
	4 scissors	
	2 three-hole punch	
	2 clipboards	
	12 three-ring binders - (1", 2", 3")	
	2 boxes manila file folders	
	Assorted file folder labels	
	Overnight mailing supplies	
	12 phone message pads	
	6 bottles all-purpose whiteout	
	Assorted envelopes (9"x12", 5"x7", 10"x13")	
	DOE-HQ memorandum letterhead	
	24 ruled notepads	
	12 steno pads	
	3" x 5" index cards	
	Return address labels	
	Packing boxes	
	5 boxes double-pocket portfolio (assorted colors)	
	Nylon filament tape	
	OFFICE EQUIPMENT	
	Telephones	
	Answering machine or voice mail capability	
	Computers/software	Provided by EH-21 for Type A investigations
	Letter-quality printers	Provided by EH-21 for Type A investigations
	Camera with flash	Contained in Type A Readiness Kit
	Film	

Accident Investigation Equipment Checklist

(✓)	Checklist	Notes
OFFICE SUPPLIES (cont'd)		
	Portable cellular phone	
	50 3.5" formatted diskettes with labels	
	Pagers (beepers)	
	Fax machine	
	Cassette tape recorder, cassettes, and batteries	
	High-speed photocopier (multifunction)	
	Document shredder	
	Electric pencil sharpener	
TOOLS		
	Flashlight or lantern (explosion-proof)	Contained in Type A Readiness Kit
	Spare batteries and bulb for flashlight	Contained in Type A Readiness Kit
	Steel tape measure - 100-foot	Contained in Type A Readiness Kit
	Scale - 12-inch ruler	Contained in Type A Readiness Kit
	Scissors (heavy-duty)	
	Compass - professional type (e.g, MILSPEC Lensatic or surveyor's)	
	Magnifying glass	
	Inspection mirrors - large & small dental	
	Toothbrush - natural bristle	
	Twine - 300-ft package wrapping	
	Cardboard tags, string	Contained in Type A Readiness Kit
	Masking tape (2-inch)	Contained in Type A Readiness Kit
SPECIAL DEVICES		
	Engineer's scale	
	Metric conversions	

Accident Investigation Equipment Checklist

(✓)	Checklist	Notes
	SPECIAL DEVICES (cont'd)	
	Calculators	
	Calipers, inside and outside diameter	
	PERSONAL PROTECTION EQUIPMENT	
	Hard hats	
	First aid kit	
	Glasses, other eye protection	
	Gloves, leather or canvas	
	Ear plugs, other hearing protection	
	Vest, orange flagperson's	
	Steel-toed boots or shoes	
	Dust masks, respirators	

This list is not exhaustive or limiting. Use this checklist as a starting point and add or delete items as needed.